

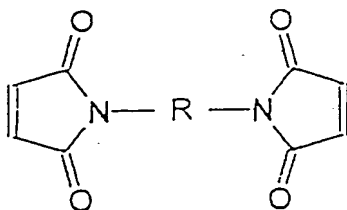
WHAT IS CLAIMED IS:

1. A metal substrate having a corrosion-proofing bond coating, comprising:

an adhesion-conferring polymer, comprising a polybismaleimide selected from the group consisting of:

- (A) a bismaleimide homopolymer;
- (B) a bismaleimide copolymer;
- (C) a homopolymer of a maleimide-terminated oligomer;
- (D) a copolymer of a maleimide-terminated oligomer;
- (E) a homopolymer of a maleimide-terminated polymer;
- (F) a copolymer of a maleimide-terminated polymer;
- (G) copolymers thereof with an organic compound containing at least one polymerizable functional group; and
- (H) and mixtures of the preceding polybismaleimides.

2. The combination of Claim 1, wherein the bismaleimide has the formula:

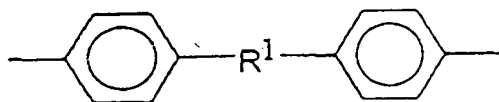


wherein R is a residue selected from the group consisting of:

- (A) a linear, substituted C<sub>1</sub>-C<sub>6</sub> hydrocarbon;
- (B) a linear, unsubstituted C<sub>1</sub>-C<sub>6</sub> hydrocarbon;
- (C) a cyclic, substituted C<sub>3</sub>-C<sub>6</sub> hydrocarbon;

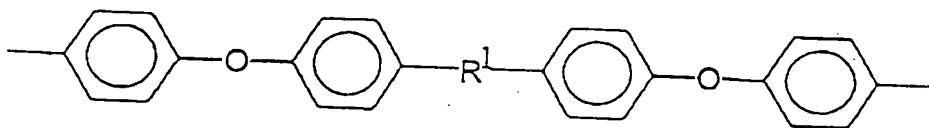
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- (D) a cyclic, unsubstituted C<sub>3</sub>-C<sub>6</sub> hydrocarbon;  
 (E) a phenylene residue;  
 (F) a biphenyl residue;  
 (G) a triazole;  
 (H) a compound with the formula:



wherein R<sup>1</sup> is selected from the group consisting of CH<sub>2</sub>-, -O-, -C(=O)-, -C(CF<sub>3</sub>)<sub>2</sub>-, -S-, -S-S-, -SO- and -SO<sub>2</sub>-; and

- (I) a compound with the formula:

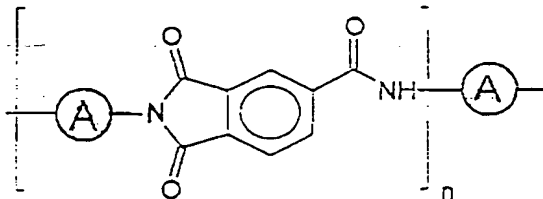


wherein R<sup>1</sup> is selected from the group consisting of CH<sub>2</sub>-, -O-, -C(=O)-, -C(CF<sub>3</sub>)<sub>2</sub>-, -S-, -S-S-, -SO- and -SO<sub>2</sub>-.

3. The combination of Claim 1, wherein the maleimide-terminated polymer is selected from the group consisting of:

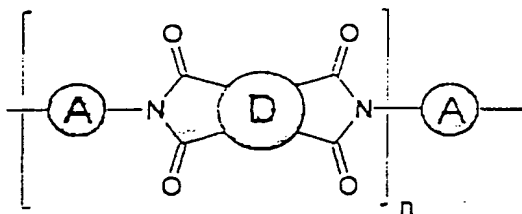
- (A) a phenol resin;  
 (B) a polyamide;

- (C) a polyether ketone;  
 (D) a polyether sulfone;  
 (E) a polyester;  
 (F) a polydiamide of a polyfunctional acid, particularly with the formula:



wherein A stands for diamine; and

(G) a polydianhydride of a polyfunctional acid, particularly with the formula:



wherein A stands for diamine and D for dianhydride.

4. The combination of Claim 1, wherein the organic compound is selected from the group consisting of:

(A) a polymerizable unsaturated monomer;

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- (B) a polymerizable unsaturated oligomer;
  - (C) a polymer;
  - (D) a compound containing an amino group;
  - (E) a compound containing a thio group;
  - (F) a compound containing allylic double bonds;
  - (G) a cyanate compound;
  - (H) an isocyanate compound;
  - (I) an epoxide;
  - (J) an alkylcarboxylic acid;
  - (K) an arylcarboxylic acid;
  - (L) an alkylphosphonic acid; and
  - (M) an arylphosphonic acid.

5. The combination of Claim 4, wherein the organic compound has one or two functional groups.

6. The combination of Claim 1, wherein the coating has a thickness of 10 to 5000 nm.

7. Method for applying a corrosion-proofing bond coating to a metal substrate, comprising

- (A) cleaning and de-greasing a substrate;
- (B) applying to the substrate a bond coating comprising an adhesion-conferring polymer; and
- (C) stabilizing the bond coating on the substrate surface;

wherein the adhesion-conferring polymer comprises at least one polybismaleimide selected from the group consisting of:

- (1) a bismaleimide homopolymer;
- (2) a bismaleimide copolymer;
- (3) a homopolymer of a maleimide-terminated oligomer;
- (4) a copolymer of a maleimide-terminated oligomer;
- (5) a homopolymer of a maleimide-terminated polymer;
- (6) a copolymer of a maleimide-terminated polymer;
- (7) copolymers thereof with an organic compound containing at least one polymerizable functional group;
- (8) and mixtures of the preceding polybismaleimides.

8. The method of Claim 7, wherein the bond coating is applied from a solution selected from the group consisting of: an organic solution and an aqueous solution.

9. The method of Claim 7, wherein the bond coating is applied from a dispersion.

10. The method of Claim 7, wherein the bond coating is applied from an emulsion.

11. The method of Claim 7, wherein the bond coating is stabilized by irradiation.

12. The method of Claim 7, wherein the bond coating is stabilized by heat.

13. The method of Claim 8, wherein the bond coating is applied from a solution having a concentration of 5 to 30 weight percent.

14. The method of Claim 8, wherein the solution contains at least one catalyst selected from the group consisting of organic peroxides and ionic catalysts.

15. The method of Claim 8, wherein the solution contains additives selected from the group consisting of dispersants and emulsifiers.

16. The method of Claim 12, wherein the bond coating is stabilized by heating at temperatures of 50°C to 250°C.

17. The method of Claim 12, wherein the bond coating is stabilized by heating at temperatures of 80°C to 200°C.

18. The method of Claim 7, further comprising:

applying to the substrate prior to application of the bond coating a film of at least one organic compound containing polymerizable functional groups and then stabilizing the film by heat.

19. The method of Claim 18, wherein the film is applied from a solution.

20. The method of Claim 18, wherein the film is applied from a solution having a concentration of 5 to 30 weight percent.

21. The method of Claim 18, wherein the film is stabilized by heating at temperatures of 20°C to 200°C.

22. The method of Claim 18, wherein the film is stabilized by heating at temperatures of 70°C to 140°C.

23. The method of Claim 7, further comprising:

applying a top coating to the bond coating on the substrate surface after stabilization of the bond coating on the substrate surface.

24. The method of Claim 7, wherein the substrate is selected from the group consisting of: steel, aluminum, galvanized steel, and magnesium substrates.

25. The method of Claim 7, wherein substrate is formed in a shape from the group consisting of bodies, engines, body parts, engine parts, subassemblies, and coils.

26. The combination of claim 1, wherein the metal substrate is an automobile body.

27. A corrosion-proofing bond coating for a metal substrate, comprising:  
a polybismaleimide selected from the group consisting of:  
(A) a bismaleimide homopolymer;  
(B) a bismaleimide copolymer;  
(C) a homopolymer of a maleimide-terminated oligomer;  
(D) a copolymer of a maleimide-terminated oligomer;  
(E) a homopolymer of a maleimide-terminated polymer;  
(F) a copolymer of a maleimide-terminated polymer;  
(G) copolymers thereof with an organic compound containing at least one polymerizable functional group;  
and  
(H) and mixtures of the preceding polybismaleimides.

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